

# *Bidding for Contracts*

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## Bidding for Contracts: Summary

Models of the bidding competition for various types of contracts are considered in this thesis. In general, the winning bidder's contract profit may be a function of the bid tendered, the *ex post* production cost, and other parameters. The analysis is focused on equilibrium bidding behavior and expected procurement costs.

Auctions in which bidders have similar tastes and opportunities are formulated as noncooperative games with incomplete information. In a Nash equilibrium, bidders' expectations about rival bids are "rational," and these expectations are endogenously determined by the structural parameters of the model. The principal results are as follows.

(1) If each bidder's production cost is deterministic, and if the contract function satisfies certain monotonicity and differentiability conditions, then the expected procurement cost is independent of the contract offered by the procuring agent. In equilibrium, the effects of contract incentives are neutralized by bidding competition. However, incentives can affect the observed differences between *ex post* production costs and bids. This suggests that the frequency and magnitudes of "cost overruns" may not be good indicators of procurement efficiency.

(2) If production costs are uncertain and if bidders are able to engage in cost reducing activities, then the contract that minimized expected procurement cost may involve a cost sharing arrangement.

(3) In all cases considered, expected procurement costs is a decreasing function of the number of potential bidders. This is because an increase in the number of competitors reduces equilibrium bids. A zero-excess profit condition can be used to determine the actual number of potential bidders. If this number approaches infinity, then the equilibrium bid converges to the bid that equate the expected utility of the contract profit with the expected utility in the event that the contract is lost.

Although auctions are commonly encountered in most economies, a significant proportion of contract agreements are made through bilateral contact, rather than through a central competitive market or auction. For example, sellers of a heterogeneous commodity may search sequentially for an acceptable price offer. A model of this type of decentralized trade is presented. In this model, price offers made by prospective buyers are optimal bids given available information about the quality characteristics of the commodity being offered for sale. The problem is formulated as a noncooperative game with incomplete information. The equilibrium is a Nash point in the search strategy of sellers and the bidding strategy of buyers. The equilibrium effects of asymmetric information are analyzed.